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Fact Sheet
Computer Modeling: Overview

What is computer modeling used for?

Computer modeling is simply a tool used by scientists and engineers to make predictions. For example, models can use mathematical equations to simulate the processes that occur when a facility releases a pollutant and also the movement of pollutants through the air.

What types of models are used for air pollutants?

Models used in air toxics programs might be divided into three types:

- Emissions models estimate the release rates of air toxics from industrial processes, storage vessel leaks, and mobile sources.
- Dispersion models estimate ambient air concentrations and deposition in the vicinity of an air emission source.
- Exposure models estimate exposure of populations or ecosystems to media concentrations of air toxics.

Dispersion models can be used in conjunction with exposure models (for example, an air dispersion model's output is the exposure model input), or the dispersion model can be an integral part of the exposure model. Numerous models of both types have been developed, with some used reliably for many years. Others are still in development. Models can utilize internal databases for some of the input data. For example, meteorological data, topographic data, and census data are currently used to estimate exposure and risk for the residual risk program.

Which model should you use?

The choice of a model and the way it is applied will depend on numerous factors such as:

- spatial scale (for example, national, regional, or local)
- temporal scale (for example, hourly, daily, or annual)
- type of pollutant (for example, gaseous, particulate, reactive)
- media and pathways (for example, air, water, soil, inhalation, ingestion)
- type of receptors (for example, general public, sensitive populations, terrestrial ecosystems, aquatic ecosystems)

- emission source type (for example, on-road mobile, non-road mobile)
- availability of input data (for example, meteorological data, census data)
- an acceptable level of uncertainty in the model's results.

By understanding the different features of individual models, you'll be able to select a model whose features are most critical to your objective. Even within a model there are modeling options, allowing the model to run in different ways as you choose. For example, within an air dispersion model you may choose to produce air concentration estimates only or to estimate the amount of removal due to dry and wet deposition for use in multipathway modeling.

Where can you find more information?

Emissions factors and models are available on OAQPS' CHIEF website. Air dispersion models are available on OAQPS' SCRAM website. Both websites can be accessed through our technology transfer network at http://www.epa.gov/ttn/.